1894–95, which begins next month. The table does not pretend to be complete; nevertheless, it will serve to show the kind of science subjects on which lectures are given to medical students outside medical technology. The courses advertised are indicated by crosses.

It has not been considered necessary to tabulate courses only given in two or three medical schools. Organic chemistry, for instance, is only down as a specific subject in the lists of lectures at the London Hospital and the University College Hospital. Probably the reason for this is that, at many colleges, the lectures on chemistry embrace the organic and the inorganic branches. Chemical physics is down in the medical curricula of the University College, Mason College, Cambridge University, and Yorkshire College, and physiological chemistry is among the courses at St. George's Hospital and Oxford University. Though psychological medicine is taught in a number of colleges, psychology only appears as the subject of lectures at St. Bartholomew's Hospital, Charing Cross Hospital, Edinburgh School of Medicine, and Queen's College, Cork. In the first two of these institutions, and also at Oxford University, pharmacology is treated distinct from practical pharmacy. It will be seen from the table that, in Scottish medical schools, the students are instructed in natural history, whereas this subject does not appear in the lists of lectures in the medical schools of England and Ireland.

Courses of lectures on bacteriology are advertised to take place at nine medical schools, but it must not be supposed that they are the only schools having facilities for carrying on this study. The *Lancet* has something to say on bacteriology and the medical curriculum. Our contemporary points out that "it is now almost imperative that those who are engaged in the teaching and study of medicine should consider the position of bacteriology in medical education with regard (*a*) to students proper, and (*b*) to those students of more mature years known as post-graduates. We think that the time has nearly come when it will be insisted upon that every medical student should receive not only some systematic instruction in the principles of bacteriology, but, more important still, should be put through a thorough, if short, course of practical laboratory instruction, in which the theories propounded in the class-room may be clearly illustrated. . . . Many of the medical schools have already recognised this fact, and in London alone there are now several well-equipped bacteriological laboratories where a thorough course of instruction can be obtained by the medical student. Guy's Hospital, University College Hospital, St. Bartholomew's Hospital, for example, have all acquired special facilities for carrying on the work; but there is still much room for the more general teaching of the subject. In the large university medical schools, especially in Oxford, Cambridge, Victoria, Durham, Edinburgh, Aberdeen, and Glasgow, the subject is more or less thoroughly taught, but not in all cases as practically as is desirable."

FORTHCOMING SCIENTIFIC BOOKS.

The following scientific books are reported as being in preparation for the forthcoming publishing season. The list, though not so lengthy as the one we printed a year ago, is still a representative one, and lovers of each and every branch of science appear to be well catered for:—

Messrs. Macmillan and Co. announce:—"A Treatise on Bessel Functions," by Profs. G. B. Matthews and A. Gray; "Elementary Treatise on the Theory of Functions," by James Harkness and Frank Morley; "Elliptic Functions," by A. C. Dixon; "Practical Plane Geometry," by J. Humphrey Spanton; "An Introductory Account of Certain Modern Ideas and Methods in Plane Analytical Geometry," by Dr. Charlotte Angas Scott; "Integral Calculus and Differential Equations for Beginners," by Joseph Edwards; "Geometrical Conic Sections," by Charles Smith; "Elementary Mensuration, with Exercises on the Mensuration of Plane and Solid Figures," by F. H. Stevens; "The Theory of Light," by Thomas Preston, second edition, thoroughly revised; "Magnetism and Electricity," by Prof. Andrew Gray, illustrated; "Steam and the Marine Steam Engine," by John Yeo, with illustrations; "Pumping Machinery," by Dr. Julius Weisbach; "A Laboratory Manual of Physics and Applied Electricity," arranged and edited by Edward L. Nichols, vol. ii. Senior Course and Outline of Advanced Work, by George S. Moler, Frederick Bedell, Homer J. Hotchkiss, Charles P. Matthews, and the Editor, illustrated; "Theoretical Chemistry," by Prof. Nernst, translated by Prof. Charles Skeele Palmer; "Manual of Physico-Chemical Measurements," by Prof. Wilhelm Ostwald, translated, with the author's sanction, by Dr. James Walker, illustrated; "Lassar Cohn's Organic Chemistry," translated by Alexander Smith; "The Rise and Development of Organic Chemistry," by the late C. Schorlemmer, F.R.S., translated and edited by Prof. Smithells; "Chemical Analysis of Oils, Fats, Waxes, and their Commercial Products," by Prof. R. Benedikt, translated, edited, and enlarged by Dr. J. Lewkowitsch; "The Planet Earth, an Astronomical Introduction to Geography," by R. A. Gregory, illustrated; "Papers on Geology," by Joseph Prestwich, F.R.S.; "The Cambridge Natural History," edited by J. W. Clark, S. F. Harmer, and A. E. Shipley; vol. iii. "Molluscs," by Rev. A. H. Cooke; "Aquatic Insects," by Prof. L. C. Miall, F.R.S., illustrated; "Text-book of the Diseases of Trees," by Prof. R. Hartig, translated by Dr. W. Somerville, with a Preface by Prof. H. Marshall Ward, F.R.S., with numerous illustrations; "Timber and Timber Trees, Native and Foreign," by Thomas Laslett, new edition, revised by Prof. H. Marshall Ward, F.R.S.; "A Text-book of Comparative Anatomy," by Dr. Arnold Lang, translated into English by Henry M. Bernard and Matilda Bernard, vol. ii.; "Human Anatomy," by Prof. Wiedersheim, translated from the last German edition by H. M. Bernard, revised and annotated by Prof. G. B. Howes, illustrated; "A Text-book of Pathology, Systematic and Practical," by Prof. D. J. Hamilton, vol. ii.; "Lessons in Practical Bacteriology," by Dr. A. A. Kanthack and J. H. Drysdale; "Mental Development in the Child and the Race," by Prof. J. Baldwin; "A Course of Experimental Psychology," by Dr. J. McKeen Cattell; Leibnitz's "Nouveaux Essais," translated by A. G. Langley; "The Right to the Whole Produce of Labour: the Origin and Development of the Theory of Labour's Claim to the Whole Product of Industry," by Prof. Menger, translated by Mary E. Tanner; "Elementary Course of Practical Science," part ii., by Hugh Gordon; "Short Studies in Earth Knowledge," by William Gee, with illustrations; "Physiography for Beginners," by J. E. Marr, F.R.S., and Alfred Harker; "Physiology for Beginners," by Dr. Michael Foster, F.R.S., and Dr. L. E. Shore; "Agriculture, Practical and Scientific," by Prof. James Muir; "Horse-Breeding for Farmers," by A. E. Pease; "Garden Plants and Flowers: a Primer for Amateurs," by J. Wright; "Greenhouse and Window Plants, a Primer for Amateurs," edited by J. Wright; "Vegetables and their Cultivation, a Primer for Amateurs, Cottage Gardeners, and Allotment Holders," by A. Dean, edited by J. Wright; "The Mechanism of Weaving," by Thomas William Fox; "Boot and Shoe Manufacture," by C. W. B. Burdett, with numerous illustrations; "Facts about Processes, Pigments, and Vehicles: a Manual for Art Students," by A. P. Laurie, illustrated.

Messrs. Sampson Low and Co. will issue:—"Instruction in Photography," "Photography with Emulsions," "Negative Making," "Colour Vision" (being the Tyndall Lectures delivered before the Royal Institution during the present year), all by Captain Abney, C.B., F.R.S.; "Art and Practice of Silver Printing," written by Captain Abney in conjunction with H. P. Robinson; "Pictorial Effect in Photography," "The Studio, and what to do in it," "Letters on Landscape Photography," by H. P. Robinson; "Specifications, for the use of Surveyors, Architects, Engineers, and Builders," by J. Leaning; "Sweet-scented Flowers and Fragrant Leaves: interesting Associations gathered from many Sources, with Notes on their History and Utility," by Donald McDonald, with sixteen coloured plates; "A Text-book of Mechanics and Hydrostatics, by Herbert Hancock, with over 400 diagrams; "Thermodynamics: treated with Elementary Mathematics, and containing applications to Animal and Vegetable Life, Tidal Friction and Electricity," by J. Parker, with numerous diagrams; "The Theory and Practice of Handwriting: a Practical Manual for the Guidance of Inspectors, School Boards, Teachers, and Students," with diagrams and illustrations, by John Jackson, second edition, greatly enlarged with two additional chapters, two extra appendices, and several pages of facsimile illustrations.

Messrs. Swan Sonnenschein and Co. will publish:—"A

Student's Text-book of Botany," by Dr. Sidney H. Vines, F.R.S., second half, completing the work; also the complete work in one volume; "Text-book of Embryology: Invertebrates," by Drs. Korschelt and Heider, translated and edited by Dr. E. L. Mark and Dr. W. L. Woodworth; part i., fully illustrated; "The Cell: its Anatomy and Physiology," by Dr. Oscar Hertwig, translated and edited by Dr. H. J. Campbell, fully illustrated; "Text-book of Palæontology for Zoological Students," by Theodore T. Groom, fully illustrated, forming a supplement to Claus and Sedgwick's "Text-Book of Zoology"; "Lectures on Human and Animal Psychology," by Prof. Wilhelm Wundt, translated and edited by James Edward Creighton and Edward Bradford Titchener; "Handbook on Systematic Botany," by Dr. E. Warming, translated and edited by Prof. M. C. Potter, fully illustrated; "Introduction to Physiological Psychology," by Dr. Theodor Ziehen, with 21 illustrations, a new and revised edition; "Zoology: Introduction to the Study of," by B. Lindsay, illustrated; "Fishes," by the Rev. H. A. Macpherson. "Flowering Plants," by James Britten; "Grasses," by W. Hutchinson; "Mammalia," by the Rev. H. A. Macpherson; "Pond Life," by E. A. Butler; "English Coins," by Llewellynn Jewitt, new edition; "Rainmaking and Sunshine," by John Collinson.

Mr. Murray's list contains:—"The Life and Correspondence of William Buckland, D.D., F.R.S.," sometime Dean of Westminster, twice President of the Geological Society, and first President of the British Association, by his daughter, Mrs. Gordon, with portraits and illustrations; "The Life of Prof. Owen, based on his Correspondence, his Diaries, and those of his Wife," by his grandson, the Rev. Richard Owen, with a chapter by the Right Hon. T. H. Huxley, with portraits and illustrations, 2 vols.; "The Scientific Papers and Addresses of Werner von Siemens," volume ii., including the following subjects: induction writing telegraph, magneto-electric quick type-writer, electric water-level indicator, mine exploder, alcohol meter, the universal galvanometer, automatically-steered torpedoes, automatic electric lamp, electric plough, electric elevator, electricity meter, energy meter, &c., with illustrations; "Handbook of Ancient Roman Marbles, consisting of a History and Description of all Ancient Columns and Surface Marbles still existing in Rome, with a List of the Buildings in which they are found," by the Rev. H. W. Pullen; "An Introduction to Physical Science," by Prof. John Cox; "The History of Astronomy," by Arthur Berry.

Messrs. Longmans and Co. have in the press, or in preparation:—A new edition, in four volumes, of Prof. Max Müller's "Chips from a German Workshop." The first volume will contain "Recent Essays," the second "Biographical Essays," the third "Essays on Language and Literature," and the fourth "Essays on the Sciences of Language, of Thought, and of Mythology"; "Butterflies and Moths (British)," by W. Furneaux, with twelve coloured plates and a large number of illustrations in the text; "Studies of Nature on the Coast of Arran," by George Milner, with illustrations; "From Edinburgh to the Antarctic," by W. G. Burn Murdoch; profusely illustrated by the author; supplemented by the Science Notes of the naturalists of the expedition, W. S. Bruce, J. J. W. Campbell, and C. W. Donald; "A Primer of Evolution: being a popular abridged edition of 'The Story of Creation,'" by Edward Clodd, with illustrations; "The Teaching of Physical Exercises," by F. J. Harvey; "Jacquard Weaving and Designing," by F. T. Bell; "The Magnetic Circuit in Theory and Practice," by Dr. H. Du Bois, translated from the German.

Mr. Edward Stanford's forthcoming works include:—"Cloudland," a study of the nature and forms of clouds, by the Rev. W. Clement Ley, with a number of coloured illustrations and reproductions from photographs; a third edition of Prof. James Geikie's "The Great Ice Age," almost entirely rewritten and with a new chapter on "The Glacial Phenomena of North America," by Prof. T. C. Chamberlin, also some new maps and diagrams; an addition, by Dr. Guillemard, on "Malaysia and the Pacific Archipelagoes," to Stanford's "Compendium of Geography and Travel," with numerous new illustrations and maps; and in the same series, volumes on "Africa" and "Asia," by A. H. Keane; a second edition of J. Scott Keltie's "The Partition of Africa," brought up to the most recent changes, and with some new maps.

In Messrs. Blackie and Son's list we notice:—"A Text-book of Organic Chemistry," by Dr. A. Bernthsen; translated by Dr. George M'Gowan, new edition, thoroughly revised and much enlarged by author and translator; "Elements of Metallurgy," by W. Jerome Harrison and William J. Harrison, jun., fully illustrated; "The Natural History of Plants: their Forms, Growth, Reproduction, and Distribution," from the German of Prof. Anton Kerner von Marilaun, translated by Prof. F. W. Oliver, with assistance of Marian Busk and Mary Ewart, with about 1000 original woodcut illustrations and sixteen plates in colours, issued in sixteen parts, also in four half-volumes, at intervals of four months.

Messrs. Whittaker and Co. will shortly issue a new edition, mostly rewritten, of Gisbert Kapp's "Electric Transmission of Energy;" "Model Engine Construction," by J. Alexander, with working drawings; "Steel Works Analysis," by Prof. J. O. Arnold; "Steam Power and Mill Work," by G. W. Sutcliffe; "The Manufacture of Modern Explosives," by Oscar Guttmann; the third and fourth (concluding) parts of C. Gordon Brodie's "Dissections Illustrated"—they will include the head, neck, and thorax, and the abdomen, respectively.

Messrs. Crosby Lockwood and Son have nearly ready for publication:—D. K. Clark's new volume on "Tramways, their Construction and Working," in which will be given a comprehensive history of the earlier forms, as well as the latest developments of tramways in this country and abroad, including the various modes of traction; a popular handbook on "Fertilisers and Feeding Stuffs, their Properties and Uses," by Dr. Bernard Dyer, with Notes on the Fertilisers and Feeding Stuffs Acts of 1893, by Mr. A. J. David.

Mr. T. Fisher Unwin is preparing:—"Travels and Studies in the Far East," by Henry Norman, illustrated; the volume supplementary to "Climbing and Exploration in the Karakoram Himalayas," by Prof. W. M. Conway, containing the scientific memoranda of the expedition by the author and various specialists; "In the Guiana Forest," by James Rodway, illustrated; "The Mountains of California," by John Muir, illustrated; and "The Story of Australian Exploration," by R. Thynne, illustrated.

The Clarendon Press will publish shortly:—"A Glossary of Greek Birds," by D'Arcy W. Thompson; "Index Kewensis," compiled at the expense of the late C. R. Darwin, under the direction of Sir Joseph D. Hooker, by B. Daydon Jackson, part iii.; "A Monograph on the Oligochæta," by Frank E. Beddard, F.R.S.; "A Manual of Crystallography," by M. H. N. Story-Maskelyne, F.R.S. (This work, which has been so long announced, is on the point of publication.)

Messrs. W. and R. Chambers have in the press, or in preparation:—"Chambers's Concise Gazetteer of the World," topographical, statistical, and historical, with pronunciation of the more difficult names of places and information regarding the derivation of names; "Elementary Science," by S. R. Todd; "Organic Chemistry," part ii., by Prof. Perkin and S. Kipping.

Messrs. Chapman and Hall announce:—"The Progress of Science: its Origin, Course, Promoters, and Results," by V. Marmery; "Naval Architecture and Shipbuilding," by G. V. C. Holmes, illustrated; "Machine Construction: a Key to the Examinations of the Science and Art Department," by Hy. Adams; "A Text-book of Mechanical Engineering," by Wilfrid J. Lineham; "Practical Plane and Solid Geometry," by Henry Angel; "The Nests and Eggs of Non-Indigenous British Birds," by Charles Dixon.

Messrs. A. and C. Black's arrangements include:—"Monism; or, the Confession of Faith of a Man of Science," by Prof. Ernst Haeckel, translated from the German by J. D. F. Gilchrist; "The Senile Heart: its Symptoms, Sequelæ, and Treatment," by Dr. George William Balfour; the last part of the "Dictionary of Birds," by Prof. Newton.

Messrs. Cassell and Co. have in hand:—"The Electric Current, how Produced and how Used," by R. Mullineux Walmsley; a new edition of "Electricity in the Service of Man," revised by Dr. Walmsley; "The Year-Book of Treatment for 1895."

Messrs. G. Bell and Sons promise:—"Arithmetic for the Standards," by Charles Pendlebury and W. S. Beard; "Cotton Weaving," by R. Marsden, illustrated; an authorised abridgment of "Webster's International Dictionary," entitled "Webster's Brief International Dictionary."

Messrs. Methuen and Co. will publish in their University

Extension Series:—"Insect Life," by F. W. Theobald, illustrated.

In Mr. Edward Arnold's list we find:—"Psychology for Teachers," by Prof. C. Lloyd Morgan; "Systematic Science Teaching," by Edward G. Howe.

The S.P.C.K. announce:—"Edible and Poisonous Mushrooms: what to eat and what to avoid," by Dr. M. C. Cooke, with eighteen coloured plates illustrating forty-eight species.

Messrs. G. P. Putnam's Sons will issue:—"Diagnosis, Differential Diagnosis, and Treatment of Diseases of the Eye," by Dr. A. E. Adams.

Messrs. W. B. Whittingham and Co. give notice of a book entitled "What is Heat?—a Peep into Nature's most Hidden Secrets," by Frederick Hovenden.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

MAJOR CRAIGIE, the Director of the Statistical Department of the Board of Agriculture, has presented a report on the distribution of grants for agricultural education in Great Britain in the financial year 1893-94. From a summary in the *Times*, it appears that out of the total vote of £8000 entrusted to the Board of Agriculture for educational purposes the necessary provision had been made for the cost of inspection, and the sum of £7450, which remained available, had been applied in the form of specific grants, a small sum being devoted to the reproduction of the records of the Rothamsted experiments for the past fifty years. The Board had been confirmed by further experience in their estimate of the value of establishing fully-equipped agricultural departments in collegiate institutions capable of aiding the work of distinct groups of local authorities charged with the provision of technical education. The collegiate centres established by the several University colleges at Bangor, Leeds, Newcastle, and Aberystwyth had continued to develop and to extend their usefulness as centres of educational energy for the surrounding counties. Further centres had been fully equipped and new agricultural teaching organisations definitely set on foot, on lines more or less similar, at Cambridge, Nottingham, and Reading. In Scotland, where the institution of definite centres was being more slowly developed than in England, several of the south-western counties had continued to make use of the facilities for agricultural instruction offered by the central classes provided, and by the itinerant lecturers supplied for local work by the Glasgow and West of Scotland Technical College. Besides assisting institutions such as the Durham College of Science and the Glasgow Technical College, where lectures on certain forestry subjects were included in the general curriculum, the Board had again been able to repeat the grant towards the cost of the special forestry class established in the University of Edinburgh. An endeavour had been made to continue, although necessarily on a reduced scale, the assistance given to experimental work, and provision had also been made for experiment stations or demonstration plots at each of the Welsh colleges. A beginning in the same direction had been made at Reading. The grants awarded by the Board during the year range from £800, given to the University College of North Wales, at Bangor, the Yorkshire College, Leeds, and the Durham College of Science, Newcastle-on-Tyne, to £25 given to the Dounby Science School, Orkney. In all there were twenty grants, eight being for work in collegiate centres, five for agricultural experiments, three for dairy instruction, one for special cheese research and agricultural experiments, one for forestry work, and two for special classes.

SCIENTIFIC SERIALS.

American Journal of Science, September.—The effect of glaciation and of the glacial period on the present fauna of North America, by Samuel H. Scudder. Statistics of the number of genera and species found in the areas formerly covered by the ice-sheet and the driftless areas respectively, and of the number common to both, would indicate whether the northern fauna had recovered from the effects of glaciation. Tables are given showing this for the Coleoptera, as the best known among insects, which are very sensitive to climatic changes. The conclusion arrived at is that, on the whole, the fauna has nearly or quite recovered from its enforced removal from the Northern States and Canada.—Tertiary and later history of the island of Cuba, by Robert T. Hill. No positive evidences of subsidence after the beginning of Tertiary time could be discovered. Nowhere do the rivers show any revival or other evidence of subsidence below the sea-level, but all have continuous downward cutting sections. On the other hand, some of these streams are now forming delta deposits in places outside their mouths, which is more indicative of present elevation than of subsidence. Since the old folding or orogenic movements occupied at least a small portion of post-Tertiary time, we may reasonably conclude that the periods of uniform uplifting must have taken place at least since the beginning of the Pleistocene. In other words, they are comparatively modern in geologic time—some of them absolutely recent.—Thermoelectric heights of antimony and bismuth alloys, by C. C. Hutchins. The best combination for a thermo-junction from these alloys is, for one element, bismuth with from 2 to 5 per cent antimony; and for the other, bismuth with from 5 to 10 per cent. tin. They may be cast into thin leaves as follows: Two pieces of plate glass are smoked slightly, or are very finely ground, and rubbed with plumbago. The metal being melted upon charcoal or under fused sodium chloride, a little pool is formed upon one plate, and the other is applied to it as quickly as possible. Leaves thus obtained can be worked with a fine file as thin as 0·03 mm. and are sufficiently tough to stand ordinary treatment.—On the nitrogen content of California bitumen, by S. F. Peckham. Oils from the tunnels in Wheeler's cañon on the south side of the Sulphur Mountain yielded 1·1095 per cent. of nitrogen. These and other oils of this region issue from strata protected from infiltration of rain-water and accompanying oxygen by overlying formations.

Quarterly Journal of Microscopical Science, vol. xxxvi. part 3.—Prof. A. G. Bourne gives an exhaustive account of the structure of *Moniligaster grandis;* and adds a revision of the genus, including diagnoses of some new species. Some good coloured figures of the different species accompany Prof. Bourne's memoir.—Mr. E. W. Macbride has a review of Spengel's monograph on Balanoglossus, and criticises that author's views on the affinities of the Enteropneusta.—Under the name *Monocystis herculea*, Mr. W. C. Bosanquet gives a number of observations on the structure and life-history of a large Gregarine found in the earth-worm *Lumbricus herculeus.*

Wiedemann's Annalen der Physik und Chemie, No. 9.—On refractive power and density of dilute solutions, by W. Hallwachs. The increase in the difference of molecular refraction previously observed with increasing dilution is completely explained by the peculiar behaviour of the density. The constitutive influences analogous to dissociation, which find their most characteristic expression in the changes of electric conductivity, have no effect upon the refractive power.—On the motion of dielectric bodies in the homogeneous electrostatic field, by L. Graetz and L. Fomm. Mascart and Joubert, in their development of Poisson's original theory, assume that small bodies placed in a dielectric do not exert any forces upon each other. This is contradicted by experiments upon small bars and plates of dielectric materials introduced into homogeneous fields, which tend to turn their axes and planes respectively into a direction parallel to the lines of force. When the condenser plates are statically charged, the rotations depend upon the sign of the charge, but in the case of oscillations they are always in the same direction and proportional to the square of the difference of potential. A small disc, made of sulphur or paraffin, suspended between the plates may be used as a "dielectric voltmeter."—On electric oscillations of long duration and their effects, by H. Ebert. The author investigates the conditions of obtaining the best luminous effects of the type of those produced by Tesla. He points out that the secondary circuit must be tuned to the primary, and that the condensers must have the least possible capacity. He describes a "luminescence lamp" made of a glass globe containing a piece of luminous paint. Oscillations are conducted to tinfoil armatures on the globe, and produce vivid luminescence. The light effects were about one-thirtieth or one-fortieth of the amyl-acetate standard. The energy consumed counted by millionths of a watt, so that the economy of the new lamp is very striking, consuming as it does only about a two-thousandth of the energy consumed by the acetate lamp. The difficulty involved in the fact that the high frequency currents